NOVEMBER/DECEMBER 2024

23PPH32 — CONDENSED MATTER PHYSICS

Shanmuga Industries Arts & Science College T.V.Malai

Time : Three hours Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL questions.

1. For BCC iron, compute the interplanar spacing in nm between the parallel planes of (2 2 0). The lattice parameter of iron is 0.2866 nm.
2. Define atomic packing factor.
3. What is a crystal lattice?
4. What is meant by Phonon?
5. State Wiedemann-Franz law.
6. Define Hall effect.
7. What is curie temperature?
8. Write note on diamagnetism.
9. Define SQUIDS.
10. Discuss about energy gap.

SECTION B — (5 × 5 = 25 marks)

Answer ALL questions.

11. (a) Explain the different types of lattice with neat diagram.

Or

(b) What is Brillouin zone? Write short note on its construction and importance.

12. (a) Elaborate quantization of lattice vibrations.

Or

(b) Discuss the concept of Debye's theory of lattice heat capacity.

13. (a) Describe the electron gas in three dimensions using Fermi-Dirac distribution.

Or

(b) What is Van-Alphen effect? Explain.

14. (a) Write the importance of quantum theory of paramagnetism.

Or

(b) What is neel temperature? Explain.

15. (a) Distinguish Type I and Type II superconductors.

Or

(b) Deduce London equations and explain how their solutions explaining Meissner effect.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. With neat diagram, explain the concept of reciprocal lattice for sc, bcc, fcc structures.

17. Give a detailed account on Umklapp process in thermal conductivity.

18. Define Hall effect. Write the construction of Fermi surface using Hall effect.

19. Discuss about the theory of anti-ferro magnetism.

20. Give the importance of BCS theory and its application on superconductivity.

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